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July 11, 1996

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

William F. Caton, Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service MM Docket No. 87-268

Dear Mr. Caton:

Please find enclosed for filing the original and six (6) copies of the Comments of Microsoft Corporation in response to the Fifth Notice of Proposed Rulemaking in the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service, MM Docket No. 87-268.

If you have any questions or need any additional information please feel free to contact me at (202) 662-8407.

Sincerely yours,

Katherine J. Palmer

Katherine J. Palmer

Enclosures

cc: Chairman Reed E. Hundt (By Hand)
Commissioner Rachelle B. Chong (By Hand)
Commissioner Susan Ness (By Hand)
Commissioner James Quello (By Hand)
International Transcription Services, Inc. (By Hand)

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List A B C D E

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

IN THE MATTER OF	)	
ADVANCED TELEVISION SYSTEMS	)	**MM Docket No. 87-268**
AND THEIR IMPACT UPON THE	)	
EXISTING TELEVISION BROADCAST	)	
SERVICE	)	

COMMENTS OF MICROSOFT CORPORATION

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July 11, 1996

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C.

IN THE MATTER OF ADVANCED TELEVISION SYSTEMS AND THEIR IMPACT UPON THE EXISTING TELEVISION BROADCAST SERVICE	)	**MM Docket No. 87-268**

COMMENTS OF MICROSOFT CORPORATION

Microsoft Corporation submits its initial comments in response to the Commission's Fifth further Notice of Proposed Rulemaking ("NPRM"). Microsoft joins in the Comments filed by the Computer Industry Coalition on Advanced Television Service ("CICATS") and the Business Software Alliance ("BSA"). Mandating the digital television ("DTV") standard proposed by the Advisory Committee on Advanced Television Service ("ACATS") would be a public policy disaster. It would impose significant costs on consumers and could serve to deter compatibility, a point made in Microsoft's comments filed in response to the Commission's Fourth further Notice of Proposed Rulemaking.[1]

While Microsoft applauds the Commission's efforts to achieve introduction of DTV and to obtain input from all concerned industries in determining whether to impose a government-mandated DTV standard, we believe the standard recommended by ACATS and proposed by the FCC is fatally flawed. That standard is simply an amalgam of old technology and compromises

[1] Comments of Microsoft Corporation to the Fourth Notice of Proposed Rulemaking in this docket (filed December 12, 1995), at 4-5.

forged in light of the investments made by the members of the Grand Alliance. The ACATS standard does not foster the advent of new technology; instead, it merely cements the technological status quo and would replicate the experience of the decades-old NTSC standard. Indeed, adoption of the ACATS standard would seem contrary to the Commission's stated purpose in this proceeding, namely to "increase the availability of new products and services to consumers through the introduction of digital broadcasting[,]" to "encourage technological innovation and competition[,]" and to "minimize regulation[.]" (NPRM ¶ 1).

Microsoft believes that the marketplace, and not the government, is the best avenue for development of a DTV standard. Reliance on a market-based standard will allow consumer preference to determine the new technological benchmark, thereby increasing competition between those manufacturers seeking to develop products using this technology, and, in turn, reducing consumers' costs. Government intrusion into a marketplace as dynamic as the emerging digital television industry should be kept to a minimum and the Commission should, as it has in other instances, most notably DBS,[2] advanced cellular,[3] and PCS,[4] allow the marketplace to choose.

If, however, the Commission determines that the public interest dictates some form of government intrusion into the DTV marketplace, Microsoft urges that it be kept to the minimum degree necessary -- the burden being on the government to make that showing -- and be the

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[2] Amendment of Subpart C of Part 100 of the Commission's Rules and Regulations with Respect to Technical Standards for Direct Broadcast Satellite Service, 60 RR.2d 1539 (1986), 1986 FCC Lexis 2818 ¶¶ 4, 12.

[3] Advanced Cellular, 3 FCC Rcd 7033.

[4] Broadband PCS, 8 FCC Rcd 7700 (1993).

least burdensome means by which to achieve the Commission's stated regulatory goals. The ACATS proposal goes well beyond any such minimal requirement. If the Commission determines that adoption of a government-mandated DTV standard would serve the public interest, Microsoft urges the Commission to adopt a DTV standard only to the extent necessary to prevent spectrum interference, or in the alternative, to adopt a modified version of the proposed DTV standard, the provisions of which we discuss below.

DISCUSSION

The Commission's latest proposal to adopt the Grand Alliance standard proposed by ACATS assumes that the ACATS standard comprises the best digital television technology, fosters innovation and competition in digital television, promotes interoperability with computers, and furthers the purposes of the Telecommunications Act of 1996. (NPRM ¶¶ 1, 7, 43, 62.) To the contrary, the proposed ACATS standard, in its current form, is contrary to the public interest, would actually stifle innovation and competition, and would impose severe costs on both consumers and industry. Viewed as a whole, the proposed ACATS standard will actually lead to higher prices and lower quality services for American consumers, delay the introduction of new DTV technologies, as well as actually hinder technological innovation in both broadcast production and transmission equipment as well as in the manufacturing of single unit PC-TVs.[5] These results are contrary to the development of a vital DTV industry in the U.S., the procompetitive thrust of the Telecommunications Act of 1996, and most importantly, the best interests of American consumers.

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[5] The CICATS comments provide a detailed discussion of these technical flaws.

The proposed ACATS standard is based on five components: video coding, audio coding, data transport, RF/transmission and receiver, plus a selection of 18 video formats. (NPRM ¶8). Microsoft is most troubled by the 18 proposed video formats because of the technological difficulties they will create for compatibility between digital televisions and computers. Therefore, if the Commission determines that it would be in the public interest to mandate some DTV standard, Microsoft urges that the Commission only adopt the baseline format proposed by CICATS.

1. It Would Be Procompetitive To Leave DTV Standard Setting to the Marketplace

Governmental standard setting, by its very nature, tends to freeze progress. This is not an intentional, but an inevitable, result. As Craig Mundie, Senior Vice President of Microsoft, stated during his testimony before the Senate Commerce Committee on June 20th of this year:

> "Any regulation of spectrum use that hampers technological progress should be unequivocally justified by clear, compelling benefits to the public which could not be achieved absent that regulation."[6]

Supreme Court Justice Breyer has pointed out that the difficulties associated with standard setting makes government-mandated standards once adopted "relatively immune to revision."[7] These standards can raise barriers to entry, make it difficult for new firms to enter,

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[6] Testimony of Craig Mundie (Microsoft Corporation) before the Committee on Commerce, Science and Transportation (June 20, 1996) (hereinafter cited as "Mundie Testimony"), Exhibit 1 hereto, at 2. Mr. Mundie was a late-appointed member of ACATS and abstained during the ACATS vote to recommend the Grand Alliance Standard to the Commission.

[7] Breyer, *Regulation and Its Reform,* at 118 (1982).

and affect competition adversely among firms already in the industry.[8] That suggests the marketplace in the first instance is likely to the best arbiter of standardization. The public should be the final arbiter of which standard best serves its interests.

2. If Any Government Standard is Required, It Should Be No Greater Than The Baseline Format Proposed by CICATS

As noted above, there appears to be no compelling reason for a government-mandated standard. However, if the Commission determines that the public interest requires some standard, it should be no greater than the baseline format proposed by CICATS. Although the ACATS proposed DTV standard has some positive aspects, it will not, in its present form, result in full compatibility between digital televisions and computers. Indeed, several of its proposed specifications will actually obstruct achievement of this goal.

If the ACATS standard is adopted, the cost of consumers will be tremendous. In order to receive all DTV programming. consumers will have to pay for equipment (televisions and set-top converter boxes) that can decode the four resolution levels and 18 video formats, some of which are high definition formats, proposed by ACATS. While manufacturing equipment with the capability to decode all of ACATS' prescribed formats is possible, it would be extremely expensive. This added cost to consumers cannot be justified and should not be endorsed by the Commission. On the other hand, by including one baseline format that can decode all digital broadcast signals, as proposed by CICATS, the Commission would be insuring that consumers could receive digital programming even from lower-cost receivers and set-top converter boxes. High definition television, while a remarkable advance in technology, is not, and should not be

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[8] Id. at 115.

made to be, a pre-requisite for transitioning to digital broadcasting. Adoption of the one baseline format proposed by CICATS would insure that consumers retain their right to choose the digital broadcast signal that best suits them. If consumers want to purchase the more expensive equipment needed to receive the high definition formats, they will be able, *but not required*, to do so. On the other hand, if consumers are satisfied with the lower cost digital broadcasting they can receive via CICATS baseline format, they will not have to expend additional money for the more expensive, and unwanted, equipment.

The NPRM acknowledges that the computer industry has been critical of the inclusion of interlaced scanning formats, non-square pixel spacing, and the 60 Hz transmission rate in the DTV standard (NPRM ¶ 49). These requirements will adversely affect picture quality and the compatibility of digital televisions and computers. The ACATS standard, specifically its incorporation of interlaced scanning in four of the 18 video formats and non-square pixel spacing, does not reflect sufficiently the advances that have occurred in digital television technology since this administrative proceeding began. These aspects of the ACATS standard render it incompatible with computers.

> The standard incorporates an obsolete technology, interlaced scanning, that produces an inferior picture and makes inter-conversion for computer uses difficult. In fact, ABC recently announced at a meeting of its affiliates that the network is leaning heavily toward the use of progressive scanning for all its high-definition TV production, because progressive scanning produces a better picture and is less expensive. Even ACATS has admitted that progressive scanning is better. Interlace was an appropriate scheme for the analog television of 40

> years ago, but it has no place in a modern digital compressed transmission system.[9]

The NPRM, however, dismisses these concerns by stating that the proposed DTV standard "has incorporated significant elements to enhance compatibility with computers."

The Commission should not adopt *any* DTV standard that includes interlaced scanning. This technology, while advanced for its day some 50 years ago, is outmoded and incompatible with today's computer applications. Interlaced scanning produces degraded images and a lower clarity for text and graphics than progressive scanning, which is currently used in computer monitors. The computer industry uses progressive scanning to insure that consumers will be able to read clearly and easily all text and graphics displayed on a monitor. The Commission should, similarly, be concerned about the quality of the text and graphics displayed on a DTV and require that any DTV standard meet the requirements for text and graphics currently in use for computers. Including the lesser quality interlace scan formats in a DTV standard would be a mistake that should be avoided so that future DTV services may be transmitted and displayed appropriately and consumers may read their television screen with the same ease as they can now read their computer screen. This will be a huge boon for education. Students in classrooms across the United States will have the benefit of easy access to the full panoply of written information.

The proposed standard's inclusion of non-square pixel spacing in two of the ADTV formats is also a problem. Computer applications typically assume that content is provided using square pixel spacing. Indeed, the Grand Alliance conceded that square pixel spacing is

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[9] Mundie Testimony at 5.

"important ... for facilitating interoperability with computers."[10] If non-square pixel spacing is included in a DTV standard, it will have to be converted to square pixel spacing to allow for manipulation and conversion of graphic images on a computer screen. While such conversion is possible, the cost of receiving digital images will be increased for consumers and picture quality will be degraded. Both of these results are contrary to the Commission's stated goals in this proceeding.

The ACATS proposed standard also includes a 60 Hz picture display rate -- a rate significantly slower than that used in today's computer monitors. Although a picture display rate of 60 Hz is not problematic for television viewing, that rate will not allow the display of high quality resolution text and graphics and will cause fatigue on television viewer's eyes as they strain to view images that will appear to flicker in their peripheral vision. A rate above at least 70 Hz would obviate these concerns. Microsoft, therefore, urges the Commission to incorporate a picture display rate of 72 Hz so that any conversion of transmission rates for computer applications will be simple. In addition, a 72 Hz picture display rate would allow for easy format conversion between a computer rate of 72 Hz and a film rate of 24 Hz. If the Commission does not modify the proposed ACATS standard to include a computer-friendly picture display rate, then *every* DTV broadcast will have to be converted to computer-compatible displays, which may be very expensive to implement — especially if there must also be a conversion from an interlaced signal to a progressive signal — and would unnecessarily increase costs for consumers.

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[10] Grand Alliance Reply at 40.

The Commission should also reconsider the ACATS standard's limitation on the use of the MPEG-2 video compression and transport standard to "layer" data so that MPEG-2's bit rate capacity can be fully utilized, thereby facilitating broadcasters ability to enhance programming. That enhancement will occur under the CICATS' baseline format. Microsoft also notes that, while the proposed ACATS standard does not include a bit error correction rate suitable for computer data, industry would most likely include a bit error correction mechanism or protocol to ensure that consumers would not be prevented from receiving identical information if there are incompatibilities between error correction standards.

CONCLUSION

For the foregoing reasons, Microsoft supports the comments filed by CICATS and BSA and urges the Commission not to adopt the ACATS standard. That standard is not in the public interest and will impose higher costs on consumers.

Respectfully submitted,

MICROSOFT CORPORATION

By _____

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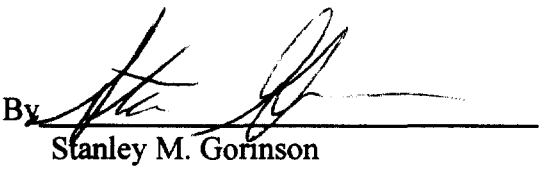
By 

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July 11, 1996

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CERTIFICATE OF SERVICE

I, Susanne Reynolds, do hereby certify that copies of the Comments of Microsoft Corporation in the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service have been served on the parties listed below via hand delivery (or as otherwise indicated) on this 11th day of July, 1996.

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*** VIA FIRST CLASS MAIL**

EXHIBIT 1

WRITTEN STATEMENT OF

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THE ELECTROMAGNETIC SPECTRUM MANAGEMENT POLICY REFORM AND PRIVATIZATION ACT

BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
OF THE UNITED STATES SENATE
WASHINGTON, D.C.

JUNE 20, 1996

TESTIMONY OF CRAIG MUNDIE,
SENIOR VICE PRESIDENT, CONSUMER PLATFORMS DIVISION
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BEFORE THE
SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
ON THE
ELECTROMAGNETIC SPECTRUM MANAGEMENT POLICY REFORM AND
PRIVATIZATION ACT

JUNE 20, 1996

Good morning, Mr. Chairman and members of the Committee. Thank you for the opportunity to testify today. I am the Senior Vice President, Consumer Platforms Division, of Microsoft Corporation. Microsoft is the world's largest publisher of software for personal computers. The Consumer Platforms Division coordinates Microsoft's efforts in developing products for advanced consumer electronic technologies, hand-held devices, set-top boxes, and other non-PC systems, among other things.

In addition to my responsibilities at Microsoft, last fall I was appointed by FCC Chairman Hundt to represent Microsoft in the final deliberations of the Advisory Committee on Advanced Television Service, or "ACATS." Microsoft had not been a member of ACATS before that appointment.

Microsoft and a number of other software publishers and computer hardware manufacturers have formed a special task force -- the Computer Industry Coalition on Advanced Television Service, or "CICATS" -- to participate in the Advanced Television debate. I am pleased to appear on behalf of CICATS this morning and to present its views on the draft Electromagnetic Spectrum Management Policy Reform and Privatization Act.

As Chairman Pressler's draft legislation recognizes, the electromagnetic spectrum is a valuable and increasingly scarce resource that should be managed in a way that maximizes opportunities for technological advancements. The development of new services that efficiently use spectrum should not be impeded by regulatory restrictions on spectrum use that promote relatively inefficient, less advanced services.

Given the limited supply of usable spectrum, tough decisions inevitably have to be made regarding its best uses. As a general matter, members of CICATS believe that the marketplace, not government, is best equipped to make these decisions. Government policies should be tailored to protecting the public interest in the most desirable uses of spectrum, but the public should be the final arbiter of which uses best serve its interests.

If the process for allocating spectrum is slow or cumbersome, or if spectrum regulation is unduly restrictive, development of new spectrum-based technologies will be discouraged. Whether or not Congress determines that spectrum should be auctioned, government policies should aim to ensure that spectrum is available when emerging advanced services require it. Any regulation of spectrum use that hampers technological progress should be unequivocally justified by clear, compelling benefits to the public which could not be achieved absent that regulation.

For example, restrictions on interference with other uses of spectrum, and regulations designed to ensure adequate spectrum for public safety, transportation, and national security uses clearly benefit the public and are

therefore generally justifiable. In contrast, the public interest would be poorly served by adoption of a standard for spectrum use that would impose significant costs on consumers and discourage future technological development.

Mandating the digital broadcast television standard (DTV) proposed by the Advanced Television Systems Committee (ATSC) will have both of these negative effects. It is costly because the standard is not layered. All receivers must be capable of decoding the highest resolution transmissions regardless of whether they are capable of displaying that resolution. Making the standard a law will lock in today's view of technological capability for a very long time. Any modifications or improvements will have to run the gauntlet of a long and arduous government approval process, something with which even the members of ATSC are already too familiar.

We do not mean to diminish the hard work of the ATSC The standard they have proposed contains some noteworthy attributes, many of which the computer industry supports. And if proponents of that standard believe it will best serve the public's needs and tastes, they should be free to produce and market products meeting the standard.

But those of us who think we can build a better mousetrap -- or digital TV receiver -- should be permitted, in fact, encouraged, to try. We should not be forced to overcome a government-mandated competitive advantage, which adoption of the standard would amount to for its advocates. The public should be allowed to decide what's best for them. Isn't that what drives a free market economy and results in the greatest economic efficiency?

The robustness of this country's computer and software industries is proof that great efficiency, innovation, and productivity can be achieved quickly when industry standards are *voluntarily* set in response to demand. Voluntary standards work. Look at cellular telephones. The FCC recognized that the detailed standards it originally prescribed for cellular telephony were holding back technological development in that industry, and it decided to relax its standards and let the industry establish more advanced standards with minimal government oversight. In doing so, the Commission acknowledged that too much government-specification of industry standards can inhibit technological progress and the availability to consumers of improved services. With Personal Communications Service, or "PCS," the FCC took an even more liberal industry-based approach to standards-setting. It should do the same with digital TV.

Our domestic computer and software industries -- like many other industries -- have thrived in large measure because of two factors: a minimum of government regulation , and open system architecture that permits hardware and software produced by many different firms to interconnect smoothly and encourages rapid, market-driven innovation. Both of these factors would be negated by the FCC's adoption of the Grand Alliance DTV standard, and the public would pay the price.

Let's look for a moment at that standard. Beyond public policy and macroeconomic, free-market considerations, there are both consumer interests and technical drawbacks that make adoption of the standard bad policy.

First, the standard does not provide for a way to manufacture low cost receivers. The encoding technique is monolithic. If a broadcaster chooses to send the highest resolution format a receiver must include all of the circuitry necessary to decode that format. In a layered system, two signals are sent in the channel simultaneously. A low resolution, easily decodable version for smaller cheaper receivers and a higher resolution detail enhancement signal for use by larger, more expensive high definition receivers. In the ATSC system, all receivers, even a little 2" portable must be burdened with means to decode resolution only perceivable on a large screen home theater unit. We have determined that even five years from now a full ATSC decoder will be three times the cost of a base layer decoder. Using the ATSC system will drive up the cost of smaller devices and require consumers to pay for capabilities they may neither need not want.

Second, from a technical perspective, the Grand Alliance standard is a poor compromise, particularly with respect to its video formats. The standard incorporates an obsolete technology, interlaced scanning, that produces an inferior picture and makes inter-conversion for computer uses difficult. In fact, ABC recently announced at a meeting of its affiliates that the network is leaning heavily toward the use of progressive scanning for all its high-definition TV production, because progressive scanning produces a better picture and is less expensive. Even ACATS has admitted that progressive scanning is better. Interlace was an appropriate scheme for the analog television of 40 years ago, but it has no place in a modern digital compressed transmission system.

But broadcasters have been using interlaced scanning for over 40 years. Despite what ABC has said, local stations will have little incentive to replace it with progressive scanning if the FCC adopts a digital standard that allows them to continue to use interlaced. And this is a critical issue for the computer industry because interlaced scanning is unacceptable for text and other computer applications. Any interlaced transmission would have to be converted at the receiver if it is to be used with a computer application. Again, added costs for the consumers.

These limitations of the ATSC proposal would make it more expensive for the domestic computer and software industries to create products – both hardware and software -- that could enhance the usefulness of digital TVs by marrying digital broadcasting and computers. For these reasons, when ACATS voted to recommend the ATSC standard to the FCC, I abstained.

NTSC broadcast television is transmitted in an analog format. Computer data is digital. As long as analog broadcasting continues, the convergence of TVs and computers will be delayed. But with the advent of digital TV, interactive applications, multimedia, and data sharing between TV and computers are all possible. The products and services that data sharing could make possible are limitless. Microsoft and other firms have committed hundreds of millions of dollars to research and development of products and services that combine computers and TVs: but these products may never reach the stores, at least not at affordable prices if overly detailed and restrictive regulatory requirements obstruct full compatibility, product development, and competition.

The Grand Alliance says that its proposal provides "adequate" compatibility with computers. We disagree. True, some of the 18 video formats are consistent with computer applications, but the standard also includes a number of inconsistent formats. And if a mandated standard incorporates even one computer-unfriendly format, receiving equipment will need to perform additional conversion and decoding of transmissions to enable interaction with computer applications, the added cost of which will fall on the consumer.

Why does the computer industry care about these issues? Two reasons, mainly. First, we don't want government regulation to freeze technological development without a compelling justification. We think a better DTV standard is possible, and we want the freedom to try it out on the market. Second, our industry knows that computers and TVs can, and will, converge, and we want to be able to develop products that take advantage of that convergence and bring new benefits to the public. Who knows how advanced our National Information Infrastructure can become, if it is allowed to.

In short, in this case, we think voluntary industry standards are better for everyone than government-mandated standards. We understand the value of minimal government-sanctioned technical transmission standards for digital broadcasting, including standards for low level digital bitstream format and modulation technique to prevent interference with other services and would not object to adoption of the ATSC's proposals with respect to those parameters, absent any specified video format.